

AC. 6/6/2012
Item No. 4.23

UNIVERSITY OF MUMBAI



Revised Syllabus for the F.Y.B.A.
Program: B.A.
Course :STATISTICS

(As per Credit Based Semester and Grading System
with effect from the academic year 2012–2013)

Schemes For F.Y.B.A STATISTICS

1) Students can opt Scheme A OR Scheme B.

2) Scheme A : These Students of F.Y.B.A. will opt ONE paper in Statistics. and will have to opt for TWO papers in Statistics at S.Y.B.A.

3) Scheme B : These students of F.Y.B.A. will opt TWO papers in Statistics (Statistics). These students will have to opt for THREE papers in Statistics at S.Y.B.A.

The course codes and the contents for the two schemes are as follows.

SCHEME A

SEMESTER I

Course Code	UNIT	TOPICS	Credits	L / Week
UASTA 101	I	Types of Data and Tabulation	2	1
	II	Graphs, Diagrams and Bivariate frequency distribution		1
	III	Measures of central tendency		1
UASTAP1	Practical based on theory		1	6

SEMESTER II

Course Code	UNIT	TOPICS	Credits	L / Week
UASTA 201	I	Measures of dispersion	2	1
	II	Correlation and regression analysis		1
	III	Index Numbers		1
UASTAP2	Practical based on theory		1	6

SEMESTER I

Course Code	Title	Credits
UASTA 101	DESCRIPTIVE STATISTICS-1	2 Credits (45 lectures)
<p>Unit I : <u>Types of Data and Tabulation:</u></p> <p>Concepts of statistical population and sample. Different types of scales nominal, ordinal, interval and ratio. Types of Data from a population : Qualitative and quantitative data; Time series data; discrete and continuous data. Primary data : Concept of a questionnaire and a schedule and distinction between them. Verification for consistency. Construction of tables with one, two or three factors of classification. Independence and Association for 2 X 2 table using Yule's coefficient of association and coefficient of colligation. Requirements of good statistical table.</p>		15 Lectures
<p>Unit II : <u>Graphs, Diagrams and Bivariate frequency distribution:</u></p> <p>Diagrammatic representation using bar diagrams and pie chart. Univariate frequency distribution of discrete and continuous variables. Cumulative frequency distribution. Graphical representation of frequency distribution by Histogram, frequency polygon, Stem and leaf diagram and Cumulative frequency polygon. Bivariate frequency distribution. Marginal and Conditional frequency distributions.</p>		15 Lectures
<p>Unit III : <u>Measures of central tendency:</u></p> <p>Concept of central tendency or location of data. Measures of central tendency or location. Arithmetic mean (simple and weighted), Combined mean, Geometric mean and Harmonic mean. Median, Quartiles, Deciles, Percentiles, Mode. Uses of Mean, Median and Mode their Merits and demerits. Requirements of good average.</p>		15 Lectures

REFERENCES .

- 1 Agarwal B.L. : Basic Statistics, New Age International Ltd.
- 2 Spiegel M.R. : Theory and Problems of Statistics, Schaum' s Publications series. Tata McGraw-Hill.
- 3 Kothari C.R. : Research Methodology, Wiley Eastern Limited.
- 4 Goon A.M., Gupta M.K., Dasgupta B. : Fundamentals of Statistics, Volume II : The World Press Private Limited, Calcutta.

DISTRIBUTION OF TOPICS FOR PRACTICALS

COURSE CODE UASTAP1 1 Credit

Sr. No	Semester I. Course UASTAP 1
1	Classification and Tabulation
2	Analysis of categorical data
3	Graphs and Diagrams
4	Measures of Central Tendency I
5	Measures of Central Tendency II

SEMESTER II

Course Code	Title	Credits
UASTA 201	DESCRIPTIVE STATISTICS-2	2 Credits (45 lectures)
Unit I: <u>Measures of dispersion:</u> Range, Semi-inter quartile range, Mean absolute deviation, Variance, Standard deviation, Combined variance and their relative measures of dispersion. Raw and Central moments up to fourth order and relationships among them. Application of Skewness and Kurtosis. Measures of Skewness and Kurtosis based on moments and quartiles.		15 Lectures
Unit II : <u>Correlation and regression analysis:</u> Scatter Diagram, Product moment correlation coefficient and its properties. Spearman's Rank correlation. Concept of linear regression. Principle of least squares. Fitting a straight line by method of least squares. Relation between regression coefficients and correlation coefficient. Fitting of curves reducible to linear form by transformation. Concept and use of coefficient determination (r^2). Fitting a quadratic curve by method of least squares. Box-whisker plot.		15 Lectures

Unit III : Index Numbers:

Index numbers as comparative tool. Stages in the construction of Price Index Numbers.
Measures of Simple and Composite Index Numbers.
Laspeyre’s, Paasche’s, Marshal-Edgeworth’s, Drobisch and Bowley’s and Fisher’s
Index Numbers formula.
Quantity Index Numbers and Value Index Numbers.
Time reversal test, Factor reversal test, Circular test.
Fixed base Index Numbers, Chain base Index Numbers.
Base shifting, splicing and deflating
Cost of Living Index Number.
Concept of Real Income based on Wholesale Price Index Number.

15 Lectures

REFERENCES:-

- 1 Agarwal B.L. : Basic Statistics, New Age International Ltd.
- 2 Spiegel M.R. : Theory and Problems of Statistics, Schaum’s Publications series. Tata McGraw-Hill.
- 3 Kothari C.R. : Research Methodology, Wiley Eastern Limited.
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DISTRIBUTION OF TOPICS FOR PRACTICALS

COURSE CODE UASTAP2 1 Credit

Sr. No	Semester II. Course UASTAP2
1	Measures of Dispersion
2	Skewness and Kurtosis.
3	Correlation Analysis and Regression Analysis
4	Curve fitting by the method of least squares
5	Index numbers

Internal Assessment of Theory Core Courses Per Semester Per Course

1. Two Assignments: 10 Marks each.

2. One Class Test: 10 Marks.
3. Active participation in class instructional deliveries:..... 05 Marks.
4. Overall conduct as a responsible student, mannerism etc :.... .05 Marks.

Internal Assessment of Practical Core Courses Per Semester per course

1. Semester work, Documentation, Journal 05 Marks.
2. Viva:05 Marks.
3. For any one or the combinations of the following activities..... 10 Marks.
 - Data collection and /or analysis.
 - Assignments with any software package.
 - Case study/project.
 - Seminar based on any topic preferably not covered in syllabus.
 - Industrial visit and its report.

Semester End Examination

Theory: At the end of the semester, examination of two hours duration and 60 marks based on the three units shall be held for each course.

Pattern of **Theory question** paper at the end of the semester for **each course** :

There shall be Four Questions of fifteen marks each. All Questions Should be compulsory.

Question1 based on Unit I, Question 2 based on Unit II, Question 3 based on Unit III, Question4 based on all Three Units combined.

Each question will have sub questions as given below:

- Attempt any ONE Out of Two questions carrying 1 Mark each.
- Attempt any TWO Out of Three questions carrying 7 Marks each.

Practicals: At the end of the semester, examination of 1 ½ hours duration and 30 marks shall be held for **each course**.

Pattern of **Practical question** paper at the end of the semester for **each course** :

There shall be Four Questions of ten marks each. Students should attempt **any three** out of the four Questions.

Question1 based on Unit I, Question 2 based on Unit II, Question 3 based on Unit III, Question4 based on all Three Units combined.

Workload

Theory :3 lectures per week per course.

Practicals: 3 lecture periods per course per week per batch. All three lecture periods of the practicals shall be conducted in succession together on a single day.

SCHEME B

- 1) These students will have the same syllabus as that of F.Y.B.Sc. Statistics.
 - 2) These students should choose TWO papers out of THREE compulsory papers and should select any TWO papers from the optional subjects.
 - 3) These students will have common teaching and evaluation with the F.Y.B.Sc. students of Statistics
- The course codes and evaluation for those F.Y.B.A. (Statistics) Scheme B will be as mentioned below.

Semester I

Course Code	UNIT	TOPICS	Credits	L / Week
USSTB 101	I	Types of Data and Tabulation	2	1
	II	Graphs, Diagrams and Bivariate frequency distribution		1
	III	Measures of central tendency		1
USSTB 102	I	Elementary Probability Theory:	2	1
	II	Concept of Discrete random variable and properties of its probability distribution		1
	III	Some Standard Discrete Distributions		1
USSTBP1	Practicals based on both courses in theory		2	6

SEMESTER II

Course Code	UNIT	TOPICS	Credits	L / Week
USSTB 201	I	Measures of dispersion	2	1
	II	Correlation and regression analysis		1
	III	Index Numbers		1
USSTB 202	I	Continuous random variable	2	1
	II	Some Standard Continuous Distributions		1
	III	Elementary topics on Estimation and Testing of hypothesis		1
USSTBP2	Practicals based on both courses in theory		2	6

SEMESTER I

Course Code	Title	Credits
UASTB 101	DESCRIPTIVE STATISTICS-1	2 Credits (45 lectures)
<p>Unit I: <u>Types of Data and Tabulation:</u></p> <p>Concepts of statistical population and sample. Different types of scales nominal, ordinal, interval and ratio. Types of Data from a population : Qualitative and quantitative data; Time series data; discrete and continuous data. Primary data : Concept of a questionnaire and a schedule and distinction between them. Verification for consistency. Construction of tables with one, two or three factors of classification. Independence and Association for 2 X 2 table using Yule's coefficient of association and coefficient of colligation. Requirements of good statistical table.</p>		15 Lectures
<p>Unit II : <u>Graphs, Diagrams and Bivariate frequency distribution:</u></p> <p>Diagrammatic representation using bar diagrams and pie chart. Univariate frequency distribution of discrete and continuous variables. Cumulative frequency distribution. Graphical representation of frequency distribution by Histogram, frequency polygon, Stem and leaf diagram and Cumulative frequency polygon.</p>		15 Lectures

Bivariate frequency distribution. Marginal and Conditional frequency distributions.	
Unit III : Measures of central tendency: Concept of central tendency or location of data. Measures of central tendency or location. Arithmetic mean (simple and weighted), Combined mean, Geometric mean and Harmonic mean. Median, Quartiles, Deciles, Percentiles, Mode. Uses of Mean, Median and Mode their Merits and demerits. Requirements of good average.	15 Lectures

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Course Code	Title	Credits
USSTB 102	STATISTICAL METHODS-1	2 Credits (45 lectures)
Unit I: Elementary Probability Theory: Trial, random experiment, sample point and sample space. Definition of an event. Operation of events, mutually exclusive and exhaustive events. Classical (Mathematical) and Empirical definitions of Probability, and their limitations. Theorems on Addition and Multiplication of probabilities. Independence of events, Conditional probability, Bayes' theorem and its applications.		15 Lectures
Unit II : Concept of Discrete random variable and properties of its probability distribution: Random variable. Definition and properties of probability distribution and cumulative distribution function of discrete random variable. Raw and Central moments (definition only) and their relationship. (upto order four). Concepts of Skewness and Kurtosis and their uses. Expectation of a random variable. Theorems on Expectation and Variance. Joint probability mass function of two discrete random variables. Marginal and conditional distributions. Theorems on Expectation, Variance, Covariance and Coefficient of Correlation. Independence of two random variables.		15 Lectures

<p>Unit III : <u>Some Standard Discrete Distributions:</u> Discrete Uniform, Binomial and Poisson distributions and derivation of their mean and variance. Recurrence relation for probabilities of Binomial and Poisson distributions And its applications. Poisson approximation to Binomial distribution (Statement only).</p>	15 Lectures

REFERENCES .

1. Medhi J. : Statistical Methods, An Introductory Text, Second Edition, New Age International Ltd.
2. Agarwal B.L. : Basic Statistics, New Age International Ltd.
3. Spiegel M.R. : Theory and Problems of Statistics, Schaum’ s Publications series. Tata McGraw-Hill.
4. David S. : Elementary Probability, Cambridge University Press.
5. Hoel P.G. : Introduction to Mathematical Statistics, Asia Publishing House.
6. Hogg R.V. and Tannis E.P. : Probability and Statistical Inference. McMillan Publishing Co. Inc.
7. PitanJim : Probability, Narosa Publishing House.
8. Goon A.M., Gupta M.K., Dasgupta B. : Fundamentals of Statistics, Volume II : The World Press Private Limited, Calcutta.

DISTRIBUTION OF TOPICS FOR PRACTICALS

COURSE CODE USSTBP1 2 Credits

Sr. No	Semester I. Course USSTBP 1(A)	Sr. No	Semester I .Course USSTBP1(B)
1	Classification and Tabulation	1	Probability.
2	Analysis of categorical data	2	Discrete Random Variable
3	Graphs and Diagrams	3	Bivariate Probability Distributions
4	Measures of Central Tendency I	4	Binomial distribution
5	Measures of Central Tendency II	5	Poisson distribution

SEMESTER II

Course Code	Title	Credits
USSTB 201	DESCRIPTIVE STATISTICS-2	2 Credits (45 lectures)
<p>Unit I: <u>Measures of dispersion:</u></p> <p>Range, Semi-inter quartile range, Mean absolute deviation, Variance, Standard deviation, Combined variance and their relative measures of dispersion. Raw and Central moments up to fourth order and relationships among them. Application of Skewness and Kurtosis. Measures of Skewness and Kurtosis based on moments and quartiles.</p>		15 Lectures
<p>Unit II : <u>Correlation and regression analysis:</u></p> <p>Scatter Diagram, Product moment correlation coefficient and its properties. Spearman's Rank correlation. Concept of linear regression. Principle of least squares. Fitting a straight line by method of least squares. Relation between regression coefficients and correlation coefficient. Fitting of curves reducible to linear form by transformation. Concept and use of coefficient determination (r^2). Fitting a quadratic curve by method of least squares. Box-whisker plot.</p>		15 Lectures
<p>Unit III : <u>Index Numbers:</u></p> <p>Index numbers as comparative tool. Stages in the construction of Price Index Numbers. Measures of Simple and Composite Index Numbers. Laspeyre's, Paasche's, Marshal-Edgeworth's, Drobisch and Bowley's and Fisher's Index Numbers formula. Quantity Index Numbers and Value Index Numbers. Time reversal test, Factor reversal test, Circular test. Fixed base Index Numbers, Chain base Index Numbers. Base shifting, splicing and deflating. Cost of Living Index Number. Concept of Real Income based on Wholesale Price Index Number.</p>		15 Lectures

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- 2 Spiegel M.R. : Theory and Problems of Statistics, Schaum's Publications series. Tata McGraw-Hill.

- 3 Kothari C.R. : Research Methodology, Wiley Eastern Limited.
 4 Goon A.M., Gupta M.K., Dasgupta B. : Fundamentals of Statistics, Volume II :
 The World Press Private Limited, Calcutta.

Course Code	Title	Credits
USSTB 202	STATISTICAL METHODS-2	2 Credits (45 lectures)
Unit I : <u>Continuous random variable:</u> Concept of Continuous random variable and properties of its probability distribution Probability density function and cumulative distribution function. Their graphical representation. Expectation of a random variable and its properties. Measures of location, dispersion, skewness and kurtosis. Raw and central moments (simple illustrations).		15 Lectures
Unit II : <u>Some Standard Continuous Distributions :</u> Uniform, Exponential (single or double parameter) and Normal distribution. Derivations of mean, median and variance for Uniform and Exponential distributions. Properties of Normal distribution and Normal curve (without proof). Normal approximation to Binomial and Poisson distribution (statement only). Use of normal tables.		15 Lectures
Unit III : <u>Elementary topics on Estimation and Testing of hypothesis:</u> Sample from a distribution : Concept of a statistic, estimate, sampling distribution, Parameter and its estimator. Concept of bias and standard error of an estimator. Central Limit theorem (statement only). Sampling distribution of sample means and sample proportion. (For large sample only) Standard errors of sample mean and sample proportion. Point estimate of single mean, single proportion from sample of large size. Statistical tests : Concept of hypothesis Null and alternate hypothesis, Types of errors, Critical region, Level of significance. Large sample tests (using central limit theorem, if necessary) For testing specified value of population mean For testing specified value in difference of two means For testing specified value of population proportion For testing specified value of difference of population proportion (Development of critical region is not expected.) Use of central limit theorem.		15 Lectures

REFERENCES:

1. Introduction to the theory of statistics: A M Mood, F.A. Graybill, D C Boyes; Third Edition; McGraw-Hill Book Company.
2. Introduction to Mathematical Statistics: R.V.Hogg, A.T. Craig; Fourth Edition; Collier McMillan Publishers.
3. Probability and Statistical Inference: R.V.Hogg, E. A.Tannis, Third Edition; Collier McMillan Publishers.
4. John E. Freund's Mathematical Statistics: I. Miller, M. Miller; Sixth Edition; Pearson Education Inc.
5. Introduction to Mathematical Statistics: P.G. Hoel; Fourth Edition; John Wiley & Sons Inc.
6. Fundamentals of Mathematical Statistics: S.C. Gupta, V.K. Kapoor; Eighth Edition; Sultan Chand & Sons.
7. Mathematical Statistics: J.N. Kapur, H.C. Saxena; Fifteenth Edition; S. Chand & Company Ltd.
8. Statistical Methods- An Introductory Text: J. Medhi; Second edition; Wiley Eastern Ltd.
9. An Outline of Statistical Theory Vol. 1: A.M. Goon, M.K. Gupta, B. DasGupta; Third Edition; The World Press Pvt. Ltd.

DISTRIBUTION OF TOPICS FOR PRACTICALS

COURSE CODE USSTBP2 2 Credits

Sr. No	Semester II. Course USSTBP2(A)	Sr. No	Semester II. Course USSTBP2(B)
1	Measures of Dispersion	1	Continuous Random Variables
2	Skewness and Kurtosis.	2	Uniform, Exponential and Normal Distributions
3	Correlation Analysis and Regression Analysis	3	Applications of central limit theorem and normal approximation
4	Curve fitting by the method of least squares	4	Testing of Hypothesis
5	Index numbers	5	Large Sample Tests

Internal Assessment of Theory Core Courses Per Semester Per Course

1. Two Assignments:10 Marks **each.**
2. One Class Test: 10 Marks.
3. Active participation in class instructional deliveries:.....05 Marks.
4. Overall conduct as a responsible student, mannerism etc :.... 05 Marks.

Internal Assessment of Practical Core Courses Per Semester per course

1. Semester work, Documentation, Journal 05 Marks.
2. Viva:05 Marks.
3. For any one or the combinations of the following activities..... 10 Marks.
 - Data collection and /or analysis.
 - Assignments with any software package.
 - Case study/project.
 - Seminar based on any topic preferably not covered in syllabus.
 - Industrial visit and its report.

Semester End Examination

Theory: At the end of the semester, examination of two hours duration and 60 marks based on the three units shall be held for each course.

Pattern of **Theory question** paper at the end of the semester for **each course** :

There shall be Four Questions of fifteen marks each. All Questions Should be compulsory.

Question1 based on Unit I, Question 2 based on Unit II, Question 3 based on Unit III, Question4 based on all Three Units combined.

Each question will have sub questions as given below:

- Attempt any ONE Out of Two questions carrying 1 Mark each.
- Attempt any TWO Out of Three questions carrying 7 Marks each.

Practicals: At the end of the semester, examination of 1 ½ hours duration and 30 marks shall be held for **each course**.

Pattern of **Practical question** paper at the end of the semester for **each course** :

There shall be Four Questions of ten marks each. Students should attempt **any three** out of the four Questions.

Question1 based on Unit I, Question 2 based on Unit II, Question 3 based on Unit III, Question4 based on all Three Units combined.

Workload

Theory :3 lectures per week per course.

Practicals: 3 lecture periods per course per week per batch. All three lecture periods of the practicals shall be conducted in succession together on a single day
